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losing their loudness, coverage, or in-car signal to noise ratios.

II. PROPOSAL

The answer is simple: Redefine FM modulation limits with respect to the RMS value of deviation instead of the peak level. By carefully choosing the time period over which the RMS value is calculated, the RMS modulation level is a simple and fairly representative measure of "loudness." All stations could be maintained at maximum equal loudness even if they chose to use light to moderate audio processing. The incentive to intentionally distort the signal to keep all programming at a defined peak level in order to be loud will be removed. The effect will be to make a significant improvement in the quality of signals received by the vast majority of the American public. It would be a far greater positive step than focusing only on interference to adjacent channels or distortion caused by limited receiver bandwidth, which are realistically potential problems with only a tiny fraction of the listening public.

III. ISSUES

There are some potential problems with this approach, but they all have solutions.

1. Uncontrolled peaks could cause interference.

The peak to RMS ratio of unprocessed FM programming increases as the RMS calculation time increases, especially for material with a wide dynamic range. By choosing a time period reasonably short, say 1 to 5 seconds, the peak to RMS ratio would be kept to a reasonable value. Stations who chose to continue aggressive processing for purposes other than just loudness would naturally maintain a low peak to RMS ratio. Once a realistic value for peak to RMS ratio is identified, the maximum allowable RMS value would be limited to that which tends to restrain peaks at non-interfering levels. If this alone was not acceptable, a secondary safety limit to peaks could be established as long as the primary RMS limit was the determining limit for the vast majority of programming.

2. Stations would be required to lower modulation below present levels resulting in a loss of coverage.

This could be a problem for aggressively processed stations assuming the new RMS limit was chosen to maintain peaks a present levels. However, by choosing an RMS limit that maintained the present RMS level of a moderately processed station, only the distortion and over compression would be reduced, not the coverage. Stations who chose to use minimal processing would be allowed a few peaks exceeding present limits but not exceeding a level which actually caused any significant interference.

3. Stations who use very aggressive processing to achieve a unique "sound" would be placed at a competitive disadvantage.

This would be true only in the sense that they would potentially be driving listeners away with their poor quality audio. All stations would be allowed to be equally "loud" regardless of how much processing they chose to use.

4. Measurement of RMS modulation would require expensive new monitors.

Modulation monitors have not been required for some time. However, most stations still use them to maintain their peak modulation at exactly 100% at all times to maximize loudness. The technology for designing RMS voltage measurement circuitry has been with us for a very long time and is fairly simple and straightforward. Relatively inexpensive RMS monitors could be added externally to existing monitors by those stations who wish to push their modulation to the absolute limit at all times. The next generation of monitors could accomplish RMS measurement by simply writing appropriate software for their internal digital signal processor circuits. Stations without monitors could continue to rely on their audio processing to maintain RMS limits.

5. The public is not complaining about the quality of FM broadcast audio, therefore it is not a problem and the Commission should not address it.

This philosophy (actually put forth by an FCC official) makes about as much sense as saying back in 1940 "We don't need FM radio because no one is complaining about the quality of AM." Only a tiny minority, if any, of the radio listening public would ever complain to the FCC that FM stations were compromising audio quality. They would simply put up with it, assuming that was just the way things had to be. The FCC has always written its rules with a primary concern for the public interest. It has always been in the public interest to create an environment which promotes the highest quality broadcast signal. Minimum coverage requirements, interference limitations, and authorization of stereo and digital technologies demonstrate the Commission's ongoing commitment to quality broadcasting.

IV. OCCUPIED BANDWIDTH LIMITATIONS

This inquiry seeks comments on using bandwidth limitations as a replacement to deviation limitations. On the surface, this theoretically seems like a good way to limit adjacent channel interference. However there are several practical considerations which make this approach undesirable.

This approach may be practical for AM stations who can reliably and permanently limit their bandwidth by simply installing the NRSC filter. FM station bandwidth is a much more complex function of peak deviation, modulating frequency, and the presence of subcarriers. As a practical matter, ongoing monitoring would still be necessary in most cases. Most stations would simply determine the peak deviation that would just exactly fill up the allotted

bandwidth and use their present monitor to maintain that level. We will have accomplished nothing except to place the burden of determining the maximum peak deviation onto the broadcaster.

By putting limitations only on the bandwidth, the Commission would create an incentive for stations to broadcast even worse signals than we have now. The goal of maximizing loudness would still exist. Given a bandwidth limitation, modulation practices would evolve that would maximize loudness at the expense of everything else. Not only would stations clip and squash their audio to stay as close as possible to the maximum peak deviation that would just fill the allowed bandwidth, they would eliminate subcarrier services and reduce high frequency content in order to trade upper modulating frequency for deviation. Depending on the bandwidth allowed, stations could conceivably increase their deviation beyond that of the bandwidth of many receivers.

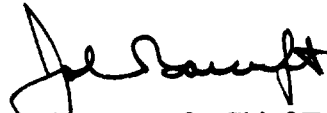
V. SUMMARY

The Commission should take the opportunity of this proceeding to redefine modulation of FM broadcast stations in terms of the RMS value of frequency deviation instead of the peak value. This definition should specify an RMS calculation time period and deviation limit that maintains present RMS modulation levels without creating significant new adjacent channel interference. By doing so, a new environment would be created which gives broadcasters an incentive to transmit higher quality signals.

Setting limits on the occupied bandwidth is not a practical approach, and it will only serve to reduce the overall quality of FM broadcasting.

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Respectfully Submitted,



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